BAYOU DU PORTAGE TMDL FOR DISSOLVED OXYGEN

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BAYOU DU PORTAGE TMDL FOR DISSOLVED OXYGEN
SUBSEGMENT 060703

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EXECUTIVE SUMMARY

Section 303(d) of the Federal Clean Water Act requires states to identify waterbodies that are not meeting water quality standards and to develop total maximum daily pollutant loads for those waterbodies. A total maximum daily load (TMDL) is the amount of pollutant that a waterbody can assimilate without exceeding the established water quality standard for that pollutant. Through a TMDL, pollutant loads can be distributed or allocated to point sources and nonpoint source (NPS) discharging to the waterbody. This report presents a TMDL that has been developed for dissolved oxygen (DO) for Bayou du Portage (Subsegment 060703), located in the Vermilion-Teche basin in southern Louisiana.

Bayou du Portage was listed on the Modified Court Ordered 303(d) List for Louisiana as not fully supporting the designated use of propagation of fish and wildlife and was ranked as priority #1 for TMDL development. Bayou du Portage was not included on the 1998 303(d) List, but was later added to the list based on LDEQ assessment data collected during June through December 1998. The suspected causes for impairment cited in the 303(d) List included organic enrichment/low DO. The water quality standard for DO is 5 mg/L.

A water quality model (LA-QUAL) was set up to simulate DO, CBOD, ammonia nitrogen, and organic nitrogen in Bayou du Portage. The model was calibrated using LDEQ assessment data collected during June through December 1998, data from FTN’s synoptic survey in September 2000, and other various information obtained from LDEQ, Corps of Engineers, and USGS. There was no intensive survey data available for this subsegment. The projection simulation was run at critical flows and temperatures to address seasonality as required by the Clean Water Act. Reductions of existing NPS loads were required for the projection simulation to show the DO standard of 5 mg/L being maintained. In general, the modeling in this study was consistent with guidance in the Louisiana TMDL Technical Procedures Manual.

A TMDL for oxygen demanding substances (CBOD, ammonia nitrogen, organic nitrogen, and sediment oxygen demand) was calculated using the results of the projection simulation. Both implicit and explicit margins of safety were included in the TMDL calculations.

The TMDL for Bayou du Portage includes a wasteload allocation for the minor point sources with oxygen demanding discharges within the subsegment. An overall average nonpoint

source reduction of 30% is required in the Bayou du Portage subsegment to meet the water quality standard for DO.

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1.0 INTRODUCTION

This report presents a total maximum daily load (TMDL) for dissolved oxygen (DO) for Bayou du Portage (subsegment 060703). This subsegment was listed on the February 29, 2000 Modified Court Ordered 303(d) List for Louisiana (EPA 2000) as not fully supporting the designated use of propagation of fish and wildlife. This subsegment was not included on the 1998 303(d) List (LDEQ 1998), but was later added to the list based on LDEQ assessment data collected during June through December 1998. The suspected sources and suspected causes for impairment in the 303(d) List are included in Table 1.1. Bayou du Portage is ranked as priority #1 for TMDL development. The TMDL in this report was developed in accordance with the Section 303(d) of the Federal Clean Water Act and EPA's regulations at 40 CFR 130.7. The 303(d) Listings for other pollutants in this subsegment are being addressed by EPA and the Louisiana Department of Environmental Quality (LDEQ) in other documents.

The purpose of a TMDL is to determine the pollutant loading that a waterbody can assimilate without exceeding the water quality standard for that pollutant and to establish the load reduction that is necessary to meet the standard in a waterbody. The TMDL is the sum of the wasteload allocation (WLA), the load allocation (LA), and a margin of safety (MOS). The WLA is the load allocated to point sources of the pollutant of concern, and the LA is the load that is allocated to nonpoint sources (NPS). The MOS is a percentage of the TMDL that accounts for the uncertainty associated with the model assumptions, data inadequacies, and future growth.

Table 1.1. Summary of 303(d) listing of subsegment 060703 (EPA 2000).

Subsegment Number	Waterbody Description	Suspected Sources	Suspected Causes	Priority Ranking (1 = highest)
060703	Bayou du Portage	Non-irrigated crop production Septic tanks	Organic enrichment/low DO Pathogen indicators Suspended solids Turbidity	1

2.0 STUDY AREA DESCRIPTION

2.1 General Information

Bayou du Portage is in the Vermilion-Teche basin in southern Louisiana. It is located northeast of New Iberia between Bayou Teche and the West Atchafalaya Basin Protection Levee (see map in Appendix A). It runs primarily east/west in the southern portion of subsegment 060703 and drains into Dauterive Lake. The drainage area of Bayou du Portage is 47.2 square miles at its confluence with Coulee Couteau (USGS 1971). The land use in subsegment 060703 is dominated by agriculture and wetland forest (Table 2.1).

Bayou du Portage is a low gradient stream and is hydraulically influenced by tidal conditions through Dauterive Lake and Lake Fausse Pointe. Although Bayou du Portage is more than 20 miles upstream of West Cote Blanche Bay, flows in the upstream direction were observed in Bayou du Portage during two surveys of Lake Fausse Pointe and Dauterive Lake during late summer 1999 (FTN 2000b). However, values of conductivity and chloride observed in Bayou du Portage near the mouth (FTN 1999 surveys) and at LDEQ station 0676 (1998 assessment data) indicate that there is negligible saltwater intrusion as far inland as Bayou du Portage.

Table 2.1. Land uses in the study area based on GAP data (USGS 1998).

Land Use Type	% of Total Area
Fresh Marsh	0.6%
Saline Marsh	0.0%
Wetland Forest	24.3%
Upland Forest	0.3%
Wetland Scrub/ Shrub	1.0%
Upland Scrub/ Shrub	0.1%
Agriculture	63.7%
Urban	4.8%
Barren	0.0%
Water	5.2%
TOTAL	100.0%

The study reach length of the Bayou du Portage extends from Dauterive Lake upstream approximately 10 miles (16 km) to Highway 345. The typical channel depth in the study reach ranges from 2.6 ft to 6.6 ft (0.8 m to 2.0 m) and the top width ranges from 62 ft to 470 ft (18.9 m to 143 m). There are no control structures on Bayou du Portage. A large portion of the area in subsegment 060703 does not drain into Bayou du Portage, but instead drains eastward towards Atchafalaya Basin and then flows south in the Borrow Pit Canal along the West Atchafalaya Basin Protection Levee.

2.2 Water Quality Standards

The numeric water quality standards and designated uses for Bayou du Portage are shown in Table 2.2. The primary numeric standard for the TMDL presented in this report is the DO standard of 5 mg/L year round.

Table 2.2. Water quality standards and designated uses (LDEQ 2000a).

Subsegment Number	060703
Waterbody Description	Bayou du Portage
Designated Uses:	ABC
Criteria:	
Chloride	80 mg/L
Sulfate	50 mg/L
DO	5.0 mg/L
pH	6.0 – 8.5
Temperature	32°C
TDS	350 mg/L

USES: A – primary contact recreation; B – secondary contact recreation; C – propagation of fish and wildlife; D – drinking water supply; E – oyster propagation; F – agriculture; G – outstanding natural resource water; L – limited aquatic life and wildlife use.

2.3 Identification of Sources

2.3.1 Point Sources

A list of NPDES permits that were identified in or near the Bayou du Portage subsegment is included in Appendix B. These permits were identified by searching two sources of information. The primary source was a listing of all the permits in the Vermilion-Teche basin (basin number 06) from the LDEQ static database. The secondary source was a listing of all the permits in the Vermilion-Teche basin (hydrologic units 08080103 and 08080102) from EPA's Permit Compliance System (PCS) on the EPA website. All of the information concerning permit parameters and design flow in Appendix B was obtained by manually retrieving hard copies of the permit files from LDEQ's file room.

Facilities without oxygen demanding parameters in their permit were assumed to exert a negligible oxygen demand in the receiving stream; therefore, these facilities were excluded from any further consideration in this TMDL. All of the facilities with oxygen demanding parameters in their permit were included in the TMDL calculations, but none of them was considered large enough, or did not discharge into a stream reaching Bayou du Portage, to be modeled explicitly. The remaining oxygen demanding discharges were included in the TMDL by adding their oxygen demand to the total loading simulated in the model.

2.3.2 Nonpoint Sources

Several nonpoint sources were cited as suspected causes of impairment for Bayou du Portage in the 303(d) List. These nonpoint sources include non-irrigated crop production and septic tanks (Table 1.1).

2.4 Previous Data and Studies

Listed below are previous water quality data and studies in or near the Bayou du Portage subsegment. Locations of selected LDEQ ambient monitoring stations and the FTN 1999 survey station are shown in Appendix A.

1. Data collected by LDEQ for "Bayou du Portage" (station 0676) for mid-June to December 1998. This station is located on at parish road 679, approximately ½ mile south of Coteau Holmes and 6 miles east of St. Martinville, LA.

2. Data collected by LDEQ for “Lake Fausse Pointe” (station 0313) for February 1991 to December 1998. This station is located 6 miles east of Loreauville, LA.
3. Data collected by FTN in support of the Dauterive Lake and Lake Fausse Pointe TMDL Survey for Bayou du Portage (station BdP-1) for August 1999 and September 1999.

3.0 CALIBRATION OF WATER QUALITY MODEL

3.1 Model Setup

In order to evaluate the linkage between pollutant sources and water quality, a computer simulation model was used. The model used for this TMDL was LA-QUAL (version 3.02), which was selected because it includes the relevant physical, chemical, and biological processes and it has been used successfully in the past for other TMDLs in Louisiana. The LA-QUAL model was set up to simulate organic nitrogen, ammonia nitrogen, ultimate carbonaceous biochemical oxygen demand (CBODu), and DO. Phosphorus and algae were not simulated.

A vector diagram of the model is shown in Appendix C. The vector diagram shows the reach/element design and the location of the modeled inflow. The model consists of 5 reaches along the main stem of Bayou du Portage, with a single inflow at the upstream end.

3.2 Calibration Period

An intensive field survey was not performed for the study area due to schedule and budget limitations. A synoptic survey of the study area was performed by FTN in September 2000, but only limited data were collected during that survey. During the 1999 FTN survey for Dauterive Lake/Lake Fausse Pointe, water quality data were collected on Bayou du Portage at BdP-1, but those data represented water flowing upstream out of Dauterive Lake. Therefore, the model was calibrated to 1998 conditions when water quality data were collected on Bayou du Portage by LDEQ at station 0676, which is located at parish road 679, ½ mile south of Coteau Holmes and 6 miles east of St. Martinville, LA.

The water quality data for this period were retrieved from the LDEQ website. These data are listed in tabular form in Appendix D and the temperature and DO are plotted and also included in Appendix D. The two conditions that usually characterize critical periods for DO are high temperatures and low flows. High temperatures decrease DO saturation values and increase rates for oxygen demanding processes (BOD decay, nitrification, and sediment oxygen demand

(SOD)). The purpose of selecting a critical period for calibration is so that the model will be calibrated as accurately as possible for making projection simulations for critical conditions.

Based on the data in Appendix D, the calibration period was selected as June 17 to September 16, 1998 (Julian day 168 to 259). This period represented the most critical period for DO.

The calibration targets (i.e., the concentrations to which the model was calibrated) for each parameter for each LDEQ station were set to the average of the concentrations measured during the calibration period with the exception of CBODu. The CBODu calibration value was calculated using total organic carbon (TOC) measured during 1998. (TOC was not measured during the calibration period.)

3.3 Temperature Correction of Kinetics (Data Type 4)

The temperature correction factors used in the model were consistent with the Louisiana Technical Procedures Manual (the "LTP"; LDEQ 2000b). These correction factors were:

- Correction for BOD decay: 1.047 (value in LTP is same as model default)
- Correction for SOD: 1.065 (value in LTP is same as model default)
- Correction for ammonia N decay: 1.070 (specified in Data Group 4)
- Correction for organic N decay: 1.020 (not specified in LTP; model default used)
- Correction for reaeration: automatically calculated by the model

3.4 Hydraulics and Dispersion (Data Types 9 and 10)

The hydraulics were specified in the input for the LA-QUAL model using the power functions (width = a * Q^b and depth = c * Q^d + e). Under low flow conditions the depth and width of the reach in the model can be assumed to be independent of flow rate. Therefore, the system was modeled with constant depth and width. This was specified in the model by setting the coefficients and exponents as follows (values for each reach are shown in Appendix E):

- width coefficient (a) = 0.00
- width exponent (b) = 0.00
- width constant (c) = typical width of reach

- depth coefficient (d) = 0.00
- depth exponent (e) = 0.00
- depth constant (f) = typical depth of reach

Widths and depths were estimated primarily from measured data, digital ortho quarter quads (DOQQ), topographic maps and information gathered from local sources (see Appendix E).

Tidal dispersion was accounted for by specifying a dispersion coefficient in data group 10 of the model input. The dispersion coefficient for Bayou du Portage was set to 30 m^2/sec, which is approximately half the value used in the upper reaches of the TMDL model developed for Lake Fausse Pointe and Dauterive Lake (FTN 2000b).

3.5 Initial Conditions (Data Type 11)

The primary parameter that is specified in the initial conditions for LA-QUAL is the temperature for each reach (because temperature was not being simulated). The temperature for Bayou du Portage was set to the average of the measured values at LDEQ station 0676 during the calibration period. The input data and sources are shown in Appendix E.

For other constituents not being simulated, the initial concentrations were set to zero; otherwise, the model would have assumed a fixed concentration of those constituents and the model would have included the effects of the unmodeled constituents on the modeled constituents (e.g., the effects of algae on DO).

3.6 Water Quality Kinetics (Data Types 12 and 13)

Kinetic rates used in LA-QUAL include reaeration rates, SOD, CBOD decay rates, nitrification rates, and mineralization rates (organic nitrogen decay). The values used in the model input are shown in Appendix E.

Reaeration was specified in the lower reaches of the Bayou du Portage model using a surface transfer coefficient. Because the two lower reaches (Reaches 4 and 5) were wide and unsheltered from the wind, the effect of wind on reaeration was included. A wind-aided surface transfer coefficient was calculated using measured wind speeds from New Orleans and Lake Charles. These daily wind speeds were averaged over the calibration period, corrected to a height of 0.1 m, and then used to calculate a wind-aided surface transfer coefficient of 0.99 m/day.

Because the upper reaches of Bayou du Portage are relatively narrow (less than 30 meters), it was assumed that wind would not significantly increase reaeration in these reaches. For reaeration in Reaches 1 to 3 the Louisiana equation (option 15) was used.

The SOD rates were developed through iteration in the calibration. The SOD rate for each reach of Bayou du Portage was adjusted so that the predicted DO concentrations were similar to the calibration target value. The CBOD decay rate was set to 0.10/day based on LDEQ's guidance for uncalibrated modeling of the Mermentau and Vermilion-Teche basins (LDEQ 2000c) and information in the "Rates, Constants, and Kinetics" publication (EPA 1985).

The mineralization rate (organic nitrogen decay) in the model was set to 0.02/day for all reaches. This value was based on information in the "Rates, Constants, and Kinetics" publication (EPA 1985). Nitrification rates were set to 0.10/day for all reaches, which is consistent with guidance in the LTP based on stream depth. The combination of these rates is consistent with LDEQ's guidance for uncalibrated modeling of the Mermentau and Vermilion-Teche basins (LDEQ 2000c). The LDEQ guidance specified a default rate of 0.05/day for nitrogenous biochemical oxygen demand (NBOD) decay, which represents the combination of mineralization and nitrification.

One other input value was specified for characterizing the nitrification process. In the program constants section of the model input file (data type 3), the nitrification inhibition option was set to 1 instead of the default of option number 2. With the default option, the nitrification rate drops rapidly when the DO drops below 2 mg/L, which results in an unrealistic build up of ammonia nitrogen at low DO values. Option number 1 provides nitrification inhibition that is similar to what is used in other water quality models such as QUAL2E and WASP (FTN 2000a).

3.7 Nonpoint Source Loads (Data Type 19)

The nonpoint source (NPS) loads that are specified in the model can be most easily understood as resuspended load from the bottom sediments and are modeled as SOD, benthic ammonia source rates, CBODu loads, and organic nitrogen loads. The SOD (specified in data type 12), the benthic ammonia source rates (specified in data type 13), and the mass loads of organic nitrogen and CBODu (specified in data type 19) were all treated as calibration parameters; their values were adjusted until the model output was similar to the calibration target values. The values used as model input are shown in Appendix E.

These four calibration parameters were adjusted in a specific order based on the interactions between state variables in the model. First, the organic nitrogen loads were adjusted until the predicted organic nitrogen concentrations were similar to the observed concentrations. Organic nitrogen was calibrated first because none of the other state variables affect the organic nitrogen concentrations. Next, the benthic ammonia source rates were adjusted until the predicted ammonia nitrogen concentrations were similar to the observed concentrations. Then the CBODu loads were adjusted until the predicted CBODu concentrations were similar to the observed concentrations. Finally, the SOD rates were adjusted until the predicted DO concentrations were similar to the observed concentrations. The DO was calibrated last because all of the other state variables affect DO.

3.8 Headwater and Tributary Flow Rates (Data Types 20 and 24)

The inflows to Bayou du Portage were calculated using the published drainage area of Bayou du Portage at Coulee Couteau of 47.2 square miles (USGS 1971). A flow/square mile was developed using the average daily flow data during the calibration period at USGS gaging station 07381440, Bayou Grosse Tete, Rosedale, LA. The value (0.16 cfs/sq mi) was then applied to the Bayou du Portage drainage area to calculate the inflow of 7.69 cfs (0.218 cms). Daily flow data for the calibration period are listed in Appendix D and values used as model input are shown in Appendix E.

3.9 Headwater and Tributary Water Quality (Data Types 21 and 25)

The temperature used in the headwater inflow was the average temperature at the LDEQ station for Bayou du Portage, LDEQ station 0676, during the calibration period. Concentrations of DO, CBODu, organic nitrogen, and ammonia nitrogen specified in the model were based on average concentrations from eight stations sampled by FTN during the 2000 synoptic survey. These eight stations represented flow from agricultural areas similar to the Bayou du Portage watershed. CBODu was estimated from TOC and ammonia nitrogen was estimated from TKN. Relationships between these parameters were developed using data from the FTN synoptic survey in September 2000 and data from LDEQ's long term BOD analyses during 2000. The median ratio of TOC to $CBOD_5$ from the FTN synoptic survey data was 6.0 and the median ratio of CBODu to $CBOD_5$ from the LDEQ long term BOD data was 4.5. Combining these ratios yielded the following relationship that was used to develop model inputs:

$$\text{CBODu} = 0.75 * \text{TOC}$$

Also, the median ratio of ammonia nitrogen to TKN from the FTN synoptic survey data was 0.17. This value was similar to the median ratio of ammonia nitrogen to TKN from the LDEQ data. The organic nitrogen was then determined as TKN minus ammonia nitrogen. This yielded the following relationships that were used to develop model inputs:

$$\text{Ammonia nitrogen} = 0.17 * \text{TKN}$$
$$\text{Organic nitrogen} = 0.83 * \text{TKN}$$

The values used as model input are shown in Appendix E.

3.10 Point Source Inputs (Data Types 24 and 25)

No point sources were modeled explicitly in the Bayou du Portage model.

3.11 Lower Boundary Condition (Data Type 27)

Because longitudinal dispersion was explicitly specified in data type 10, the model required input values for downstream boundary conditions. The downstream boundary of Bayou du Portage is Dauterive Lake. Observed data were available during the calibration period at Lake Fausse Pointe (LDEQ station 0313), which is just below Dauterive Lake. This measured data included temperature, DO, TKN and nitrate+nitrite. Although not available during the specific calibration period, TOC was measured routinely from 1991 to 1998; therefore a historical average was calculated. The input value for CBODu, organic nitrogen and ammonia nitrogen were calculated using measured data for TKN and TOC as described above for the headwater inflow. The values used as model input are shown in Appendix E.

3.12 Model Results for Calibration

Plots of predicted and observed water quality for the calibration are presented in Appendix F and a printout of the LA-QUAL output file is included as Appendix G. The calibration was considered to be acceptable based on the amount of data that were available.

4.0 WATER QUALITY MODEL PROJECTION

EPA's regulations at 40 CFR 130.7 require the determination of TMDLs to take into account critical conditions for stream flow, loading, and water quality parameters. Therefore, the calibrated model was used to project water quality for critical conditions. The identification of critical conditions and the model input data used for critical conditions are discussed below.

4.1 Identification of Critical Conditions

Section 303(d) of the Federal Clean Water Act and EPA's regulations at 40 CFR 130.7 both require the consideration of seasonal variation of conditions affecting the constituent of concern and the inclusion of a MOS in the development of a TMDL. For the TMDL in this report, analyses of LDEQ long-term ambient data were used to determine critical seasonal conditions. A combination of implicit and explicit MOS was used in developing the projection model.

Critical conditions for DO have been determined for the Vermilion-Teche basin in previous TMDL studies. The analyses concluded that the critical conditions for stream DO concentrations occur during periods with negligible nonpoint runoff, low stream flow, and high stream temperature.

When the rainfall runoff (and nonpoint loading) and stream flow are high, turbulence is higher due to the higher flow and the stream temperature is lowered by the cooler precipitation and runoff. In addition, runoff coefficients are higher in cooler weather due to reduced evaporation and evapotranspiration, so that the high flow periods of the year tend to be the cooler periods. DO saturation values are, of course, much higher when water temperatures are cooler, but BOD decay rates are much lower. For these reasons, periods of high loading are periods of higher reaeration and DO but not necessarily periods of high BOD decay.

LDEQ interprets this phenomenon in its TMDL modeling by assuming that the annual nonpoint loading, rather than loading for any particular day, is responsible for the accumulated benthic blanket of the stream, which is, in turn, expressed as SOD and/or resuspended BOD in the model. This accumulated loading has its greatest impact on the stream during periods of higher temperature and lower flow.

According to the LTP, critical summer conditions in DO TMDL projection modeling are simulated by using the annual 7Q10 flow or 0.1 cfs, whichever is higher, for all headwaters, and 90th percentile temperature for the summer season. Model loading is from point sources, perennial tributaries, SOD, and resuspension of sediments. In addition, all point sources are assumed to be discharging at design capacity.

In reality, the highest temperatures occur in July-August, the lowest stream flows occur in October and November, and the maximum point source discharge occurs following a significant rainfall, i.e., high-flow conditions. The combination of these conditions plus the impact of other conservative assumptions regarding rates and loadings yields an implicit MOS that is not quantified. Over and above this implicit MOS, an explicit MOS of 20% for point sources and 10% for NPS was incorporated into the TMDL in this report to account for future growth and model uncertainty.

4.2 Temperature Inputs

The LTP (LDEQ 2000b) specified that the critical temperature should be determined by calculating the 90th percentile seasonal temperature for the waterbody being modeled. Because the LDEQ station in the study area had only 6 months of data, LDEQ data from an adjacent subsegment were used for this analysis. Long term temperature data from Lake Fausse Pointe (LDEQ station 0313) were used to calculate a 90th percentile summer temperature of 31.6ºC. However, the water temperatures for the Bayou du Portage station during June through December 1998 were cooler than temperatures in the Lake Fausse Pointe study area during that time. Therefore, the critical temperature for Bayou du Portage was estimated as the 90th percentile summer temperature for Lake Fausse Pointe (31.6ºC) minus the average temperature difference (1.2ºC) during June through December 1998 between the Lake Fausse Pointe and Bayou du Portage stations. This value was specified in data type 11 in the model input and is shown in Appendix H.

Because the Bayou du Portage subsegment has a year round standard for DO, a winter projection simulation was not performed. As discussed above, the most critical time of year for meeting a constant DO standard is the period of high temperatures and low flows (i.e., summer).

4.3 Headwater and Tributary Inputs

The data source for the headwater inflow rate for the Bayou du Portage calibration simulation were observed values from the USGS gaging station on Bayou Grosse Tete at Rosedale, LA. For the projection simulation the 7Q10 value established at this same gaging station is 0 cfs (Lee et al. 1997). In addition, the adjacent subsegment containing Dauterive Lake and Lake Fausse Pointe also has a 7Q10 of 0 cfs (FTN 2000b). According to the LTP the critical flow rates for summer should be set to either the 7Q10 flow or 0.1 cfs, whichever is higher. Also, the LTP specifies that the DO concentration for headwater and tributary inflows should be set to 90% saturation at the critical temperature which is 30.4ºC. The values used as model input in the projection simulation are shown in Appendix H.

4.4 Point Source Inputs

There are no major point source inputs modeled in this study area. There are 8 minor point sources that are included in the TMDL. A list of dischargers is included in Appendix B. It should be noted that although a discharge of greater that 1 mgd is included on the list, the outfall is Bayou Martin, not Bayou du Portage. Bayou Martin is located in the northern portion of the subsegment, but does not drain into Bayou du Portage; therefore this discharger is being represented as a minor point source and included in the TMDL but not the model.

4.5 Nonpoint Source Loads

Because the initial projection simulation was showing low DO values in most of the reaches, the NPS loadings were reduced until all of the predicted DO values were equal to or greater than the water quality standard of 5.0 mg/L. Within each reach, the same percent reduction was applied to all components of the NPS loads (SOD, benthic ammonia source rates, and mass loads of CBODu and ammonia nitrogen). The values used as model input in the projection simulation are shown in Appendix H.

An overall average reduction of 30% of NPS loads was needed in order to meet the standard for DO of 5 mg/L. This overall reduction value was calculated based on the individual reductions for each reach (which ranged from 0% to 70%) and their respective lengths and widths.

4.6 Downstream Boundary

For the projection simulation, the downstream boundary condition for temperature was set to the same as the critical temperature for Bayou du Portage. This was done so that the model would not change the temperature in Bayou du Portage. For DO, CBODu, organic N, ammonia N, and nitrite+nitrate the downstream boundary was set to the predicted values in the Lake Dauterive reach of the Lake Fausse Pointe and Dauterive Lake TMDL (FTN 2000b). The values used as model input in the projection simulation are shown in Appendix H.

4.7 Reaeration

Reaeration for the projection simulation was calculated based on long-term average wind speed (as opposed to using wind speed for specific days for the calibration). The long-term average wind speeds for the months of May through October at New Orleans and Lake Charles (the same stations used for the calibration) were used to calculate a wind-aided reaeration coefficient in the same manner and for the same reaches as in the calibration. The months of May through October represent the summer months, or critical months, per the LTP. The values used as model input in the projection simulation are shown in Appendix H.

4.8 Other Inputs

The only model inputs that were changed from the calibration to the projection simulation were the inputs discussed above in Sections 4.2 through 4.7. All of the other model inputs (e.g., hydraulic and dispersion coefficients, decay rates, etc.) were unchanged from the calibration simulation.

4.9 Model Results for Projection

Plots of predicted water quality for the projection are presented in Appendix I and a printout of the LA-QUAL output file is included as Appendix J.

For Reaches 1 through 4 of Bayou du Portage (the upper reaches), NPS load reductions of 15% to 70% were required to bring the predicted DO values to at least 5.0 mg/L. In Reach 5, the most downstream reach, reduction of the NPS load was not necessary because the predicted DO value was greater than the standard of 5.0 mg/L. The overall NPS load reduction for the subsegment is 30%. Reduction of NPS loads was necessary because there are no point source loads that have an effect on the predicted DO.

The percentage reductions for NPS loads mentioned above represent percentages of the entire NPS loading, not percentages of the manmade NPS loading. The NPS loads in this report were not divided between natural and manmade because it would be difficult to estimate natural NPS loads for Bayou du Portage.

5.0 TMDL CALCULATIONS

5.1 DO TMDL

A total maximum daily load (TMDL) for DO is calculated for Bayou du Portage based on the results of the projection simulation. The DO TMDLs is presented as oxygen demand from CBODu, organic nitrogen, ammonia nitrogen, and SOD. TMDL calculations are shown in Appendix K. A summary of the loads is presented in Table 5.1.

Table 5.1. DO TMDL for Subsegment 060703 (Bayou du Portage).

	Oxygen Demand from:(kg/day)				
Source of Oxygen Demand	**CBODu**	**Organic N**	**Ammonia N**	**SOD**	**Total Oxygen Demand (kg/day)**
WLA for minor point sources	98.46	0	291.71	NA	390
MOS for Point Sources	24.61	0	72.93	NA	97
LA for Nonpoint Sources	777	118	0.38	743	1638
MOS for Nonpoint Sources	86	13	0.04	83	182
Total Maximum Daily Load	986	131	365.05	825	2307

The oxygen demand from organic nitrogen and ammonia nitrogen was calculated as 4.33 times the nitrogen loads (assuming that all organic nitrogen is eventually converted to ammonia). The value of 4.33 is the same ratio of oxygen demand to nitrogen that is used by the LA-QUAL model. For the SOD loads, a temperature correction factor was included in the calculations (in order to be consistent with LDEQ procedures).

The WLA for minor point sources represents the loads from small oxygen demanding discharges that were not explicitly modeled. In general, the WLA was based on current permit limits with no reductions. Because the discharges do not have a permit limit for ammonia nitrogen, effluent concentrations for ammonia nitrogen were assumed based on the BOD_5 permit limits and typical combinations of BOD_5 and ammonia nitrogen listed in the LTP (LDEQ 2000b).

Because the WLAs for minor point sources represented loads that were not simulated in the model, these loads were added to the model loads for the TMDL. The MOS for minor point sources was set to 20% of the total minor point source loading. The LA for NPS was calculated as 90% of the NPS load simulated in the model. The other 10% of the NPS load simulated in the model was designated as an explicit MOS.

5.2 Summary of NPS Reductions

The projection modeling used to develop the TMDLs above showed that NPS loads need to be reduced 15% to 70% in Reaches 1 through 4 (see Data Type 19 in Appendix H). No reductions in NPS loads were required for Reach 5.

5.3 Seasonal Variation

As discussed in Section 4.1, critical conditions for DO in Louisiana waterbodies have been determined to be when there is negligible nonpoint runoff and low stream flow combined with high water temperatures. In addition, the models account for loadings that occur at higher flows by modeling sediment oxygen demand. Oxygen demanding pollutants that enter the waterbodies during higher flows settle to the bottom and then exert the greatest oxygen demand during the high temperature seasons.

5.4 Margin of Safety

The MOS accounts for any lack of knowledge or uncertainty concerning the relationship between load allocations and water quality. As discussed in Section 4.1, the highest temperatures occur in July and August, the lowest stream flows occur in October and November, and the maximum point source discharge occurs following a significant rainfall, i.e., high-flow conditions. The combination of these conditions, in addition to other conservative assumptions regarding rates and loadings, yields an implicit MOS that is not quantified. In addition to the implicit MOS, the TMDL in this report included explicit margins of safety of 20% for point source loads and 10% for NPS loads.

6.0 SENSITIVITY ANALYSES

All modeling studies necessarily involve uncertainty and some degree of approximation. It is therefore of value to consider the sensitivity of the model output to changes in model coefficients, and in the hypothesized relationships among the parameters of the model. The sensitivity analyses were performed by allowing the LA-QUAL model to vary one input parameter at a time while holding all other parameters to their original value. The projection simulation was used as the baseline for the sensitivity analysis. The percent change of the model's minimum DO projections to each parameter is presented in Table 6.1. Each parameter was varied by ±30%, except for temperature, which was varied ±2ºC.

Values reported in Table 6.1 are sorted by percentage variation of minimum DO from smallest percentage variation to largest. Reaeration was the parameter to which DO was most sensitive (10% to 18%). The other parameters causing the greatest variations in the minimum DO values were initial temperature, velocity, and SOD (5% to 6%). The model results were slightly sensitive to depth and BOD decay rate with variations in predicted DO of 2%. The model was not sensitive to headwater flow or dispersion.

Table 6.1. Summary of results of sensitivity analyses.

Input Parameter	Parameter Change	Predicted minimum DO (mg/L)	Percent Change in Predicted DO (%)
Baseline	-	5.08	N/A
Dispersion	+30%	5.08	<1
Dispersion	-30%	5.08	<1
Headwater flow	+30%	5.08	<1
Headwater flow	-30%	5.08	<1
Waste Load BOD	+30%	5.08	<1
Waste Load BOD	-30%	5.08	<1
Waste Load DO	+30%	5.08	<1
Waste Load DO	-30%	5.08	<1
Waste Load flow	+30%	5.08	<1
Waste Load flow	-30%	5.08	<1
Waste Load NH3	+30%	5.08	<1
Waste Load NH3	-30%	5.08	<1
Waste Load Organic N	+30%	5.08	<1
Waste Load Organic N	-30%	5.08	<1
NH3 decay rate	+30%	5.07	<1
Organic N decay rate	+30%	5.07	<1
NH3 decay rate	-30%	5.10	<1
Organic N decay rate	-30%	5.10	<1
BOD decay rate	+30%	5.00	2
Depth	+30%	4.99	2
Depth	-30%	5.19	2
BOD decay rate	-30%	5.21	3
SOD (Benthal)	+30%	4.81	5
SOD (Benthal)	-30%	5.36	6
Velocity	+30%	4.80	6
Velocity	-30%	5.36	6
Initial Temperature	+2^{o}C	4.76	6
Initial Temperature	-2^{o}C	5.41	6
Reaeration	+30%	5.60	10
Reaeration	-30%	4.19	18

7.0 OTHER RELEVANT INFORMATION

This TMDL has been developed to be consistent with the antidegradation policy in the LDEQ water quality standards (LAC 33:IX.1109.A).

Although not required by this TMDL, LDEQ utilizes funds under Section 106 of the federal Clean Water Act and under the authority of the Louisiana Environmental Quality Act to operate an established program for monitoring the quality of the state's surface waters. The LDEQ Surveillance Section collects surface water samples at various locations, utilizing appropriate sampling methods and procedures for ensuring the quality of the data collected. The objectives of the surface water monitoring program are to determine the quality of the state's surface waters, to develop a long-term data base for water quality trend analysis, and to monitor the effectiveness of pollution controls. The data obtained through the surface water monitoring program is used to develop the state's biennial 305(b) Report (Water Quality Inventory) and the 303(d) List of impaired waters. This information is also utilized in establishing priorities for the LDEQ NPS program.

The LDEQ has implemented a watershed approach to surface water quality monitoring. Through this approach, the entire state is sampled over a five-year cycle with two targeted basins sampled each year. Long-term trend monitoring sites at various locations on the larger rivers and Lake Pontchartrain are sampled throughout the five-year cycle. Sampling is conducted on a monthly basis or more frequently if necessary to yield at least 12 samples per site each year. Sampling sites are located where they are considered to be representative of the waterbody. Under the current monitoring schedule, targeted basins follow the TMDL priorities. In this manner, the first TMDLs will have been implemented by the time the first priority basins will be monitored again in the second five-year cycle. This will allow the LDEQ to determine whether there has been any improvement in water quality following establishment of the TMDLs. As the monitoring results are evaluated at the end of each year, waterbodies may be added to or removed from the 303(d) List. The sampling schedule for the first five-year cycle is shown below. The Mermentau and Vermilion-Teche Basins will be sampled again in 2003.

1998 – Mermentau and Vermilion-Teche River Basins
1999 – Calcasieu and Ouachita River Basins
2000 – Barataria and Terrebonne Basins
2001 – Lake Pontchartrain Basin and Pearl River Basin
2002 – Red and Sabine River Basins

(Atchafalaya and Mississippi Rivers will be sampled continuously.)

In addition to ambient water quality sampling in the priority basins, the LDEQ has increased compliance monitoring in those basins, following the same schedule. Approximately 1,000 to 1,100 permitted facilities in the priority basins were targeted for inspections. The goal set by LDEQ was to inspect all of those facilities on the list and to sample 1/3 of the minors and 1/3 of the majors. During 1998, 476 compliance evaluation inspections and 165 compliance sampling inspections were conducted throughout the Mermentau and Vermilion-Teche River Basins.

8.0 PUBLIC PARTICIPATION

When EPA establishes a TMDL, 40 CFR §130.7(d)(2) requires EPA to publicly notice and seek comment concerning the TMDL. Pursuant to an October 1, 1999 Court Order, this TMDL was prepared under contract to EPA. After submission of this TMDL to the Court, EPA commenced preparation of a notice seeking comments, information, and data from the general and affected public. Comments and additional information were submitted during the public comment period and this Court Ordered TMDL was revised accordingly. Responses to these comments and additional information are included in Appendix L. EPA has transmitted this revised TMDL to the Court and to LDEQ for incorporation into LDEQ's current water quality management plan.

9.0 REFERENCES

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FTN. 2000a. Bayou Lacassine Watershed TMDL for Dissolved Oxygen. Prepared for LDEQ by FTN Associates, Ltd., Little Rock, AR: September 2000.

FTN. 2000b. Lake Fausse Pointe and Dauterive Lake TMDL for Dissolved Oxygen and Nutrients. Prepared for LDEQ by FTN Associates, Ltd., Little Rock, AR: September 2000.

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Wiland, B.L., and K. LeBlanc. LA-QUAL for Windows User's Manual, Model Version 3.02, Manual Revision B. Wiland 2000 Consulting, Inc. and Louisiana Department of Environmental Quality. March 23, 2000.

APPENDICES A THROUGH K ARE AVAILABLE FROM EPA UPON REQUEST

APPENDIX L

Responses to Comments

COMMENTS AND RESPONSES
BAYOU DU PORTAGE
TMDLs FOR DO AND NUTRIENTS
April 19, 2002

EPA appreciates all comments concerning these TMDLs. Comments that were received are shown below with EPA responses inserted in a different font.

GENERAL COMMENTS FROM LOUISIANA DEPARTMENT OF ENVIRONMENTAL QUALITY (LDEQ) (some of these comments may not apply to this report):

In view of LDEQ's TMDL development schedule and the rapidly approaching deadline, LDEQ has made a limited review of the TMDLs published by EPA on October 15, 2001. LDEQ expects to make a more detailed review on at least some of these TMDLs after the first of the year. In the future, LDEQ requests that EPA provide hard copies of the TMDLs and Appendices for LDEQ review. Several electronic files required software which is not used by LDEQ thus making it impossible to review some portions of several TMDLs. Hard copies will insure that the complete official document is being reviewed and will eliminate the time required for LDEQ to try to put together the document from electronic files. In general, LDEQ found these TMDLs to be unacceptable, based on inadequate data and not implementable.

Federal Register Notice: Volume 66, Number 199, pages 52403 - 52404 (10/15/2001)

A. Vermilion River Cutoff DO and Nutrients .pdf
B. Bayou Chene DO .pdf
C. Bayou du Portage DO .pdf
D. Bayou Mallet DO, Nutrients and Ammonia .pdf
E. Bayou Petite Anse DO and Nutrients .pdf
F. Bayou Tigre DO and Nutrients .pdf
G. Big Constance Lake and Mermentau Coastal Bays and Gulf Water TMDLs for DO and Nutrients .pdf
H. Charenton Drainage and Navigation Canal and West Cote Blanche Bay TMDLs for DO and Nutrients.pdf
I. Chatlin Lake Canal/Bayou Du Lac and Bayou Des Glaises Diversion Channel TMDLs for DO and Nutrients.pdf
J. Dugas Canal DO and Nutrients .pdf
K. Franklin Canal DO and Nutrients .pdf
L. Freshwater Bayou Canal DO and Nutrients .pdf
M. Irish Ditch/Big Bayou DO .pdf

N. Lake Arthur, Grand Lake, and Gulf Intracoastal Waterway TMDLs for DO, Nutrients, and Ammonia .pdf
O. Lake Peigneur DO and Nutrients .pdf
P. New Iberia Southern Drainage Canal DO and Nutrients .pdf
Q. Spanish Lake DO .pdf
R. Tete Bayou DO and Nutrients .pdf
S. Bayou Carron DO and Nutrients .pdf
T. West Atchafalaya Basin Protection Levee Borrow Pit Canal DO.pdf

1. Many of these TMDLs are based on models using historical water quality data gathered at a single location rather than survey data gathered at several sites spaced throughout the waterbody. Hydraulic information used was generally not taken at the same time as the water quality data used. The availability of only one water quality data site is not sufficient justification to simulate the subsegment using a one reach, one element model. Additional reaches and elements must be used to represent the subsegment and additional data must be obtained in order for these TMDLs to be valid. The recommended maximum limits cited in the LAQUAL User's Manual for element width and length have been grossly exceeded in many of the models. The spreadsheet calibration and projection graphs that were provided do not match the plots produced by the LA-QUAL model. Please explain why they do not match. The LAQUAL graphics for a few elements produces a graph that does not represent the model output. It's an anomaly of the graphics routine. The calibrations are inadequate due to the lack of a hydrologic calibration and the paucity of water quality data. The resulting TMDLs are invalid. LDEQ does not accept these TMDLs.

Response: The TMDLs were based on existing data plus information that could be obtained with available resources. Each model was developed using the most appropriate hydraulic information and water quality data that were available. The level of detail at which each subsegment was modeled was consistent with the amount of available data. Although having only one element in a model causes inaccuracies in the LAQUAL graphics, having only one element in a model does NOT cause errors in the tabular output (which is what the graphs in the reports are based on). Although LDEQ typically collects more data for model calibration than what was available for calibration of these models, EPA considers these model calibrations and the resulting TMDLs to be valid.

2. LDEQ does not consider any of these waters to be impaired due to nutrients or ammonia. LDEQ does not consider Vermilion River Cutoff (060803), Mermentau Coastal Bays and Gulf Water (050901), Charenton Drainage and Navigation Canal (060601), West Cote Blanche Bay (061001), Bayou Des Glaises Diversion channel (060207), Grand Lake (070701), Gulf Intracoastal Waterway (050702, Lake Peigneur (060909), New Iberia Southern Drainage Canal (060904) and West Atchafalaya Basin Protection Levee Borrow Pit Canal to be impaired by biochemical oxygen-demanding substances. Many of these waters simply have inappropriate

standards and criteria. The resources spent on developing these TMDLs could have been far more effectively and wisely spent on reviewing, approving, and assisting in the development of appropriate standards and criteria for these waters through the UAA process.

Response: TMDLs were developed for these subsegments based on the requirements of Section 303(d) of the Clean Water Act and regulations at 40 CFR 130.7 and the suspected causes of impairment (organic enrichment/low DO, nutrients, or ammonia) for each subsegment in the EPA Modified Court Ordered 303(d) List.

3. Remove the reference and all references to the unpublished LDEQ document, "Defaults for Uncalibrated Modeling". This is not an acceptable reference and any defaults selected on this basis must be reevaluated and based on acceptable references. Some of the models must be redone because of inappropriately selected defaults. At this time, LDEQ has no plans to revise, complete or publish this document.

Response: The unpublished LDEQ document that is mentioned here was provided to EPA's contractor without any instructions not to use it. The model coefficients listed in that document appear to be reasonable and consistent with values used in other modeling studies in southern Louisiana.

4. The percent reduction of the nonpoint source load must not be reported as an overall average of the individual percent reduction applied to each reach. This approach does not insure that standards will be met in all reaches and will be difficult to implement. In consideration of future implementation plans, LDEQ does not vary the percent reduction required from reach to reach. LDEQ uses a uniform percent reduction within a watershed unless there are unique conditions, such as a general change in landuse, that dictate a further breakdown. These unique conditions must be adequately documented in the report in order to facilitate future implementation plans. Specifying type of land use is helpful in defining nonpoint loading. LDEQ requests a calculation sheet of the NPS reduction percentages and asks that language be added to the report describing the calculation process.

Response: EPA appreciates this comment but believes that an average percent reduction is acceptable. EPA will consider this in future development of TMDLs in Louisiana.

In the lower Mermentau and Vermilion River Basins, much of the nonpoint loading affecting some of these subsegments and adding to their benthic blanket is coming from the tributaries feeding them. Many of the headwater tributaries have recent TMDL's that require dramatic percentage reductions to the nonpoint contributions. By implementing the reductions to nonpoint loads upstream, the current problems in these lower subsegments will be reduced.

Response: EPA recognizes that TMDLs have been developed upstream of several of these subsegments. Implementing upstream reductions in nonpoint loads should require much less reduction of loadings from within these subsegments. The required percent reductions for these subsegments were not intended to be in addition to upstream reductions.

5. The percentage reductions listed were not calculated based on the written procedure described in several TMDLs. These values did not take the MOS into consideration. It is also LDEQ's policy to make a no-man-made load projection run which will estimate the natural background loads. The contractor should include a no-man-made load projection run in each TMDL report.

Response: The percent reductions were calculated by subtracting the projection input value from the calibration input value and then dividing by the calibration input value. This procedure is slightly different than what LDEQ uses but still provides percent reductions that are useful.

6. CBODu and NH3-N were estimated from surrogate parameters rather than actual measured data for most of the TMDLs. Based on the measured data from the last two years of LDEQ water quality surveys, LDEQ objects to the correlation of TOC to CBOD and NH3-N to TKN, unless these correlations are taken from water quality data on the modeled waterbody. Our studies have shown only a moderate correlation between these two parameters within the same waterbody, however when this correlation was attempted across waterbodies extreme variability was seen and the correlation was not judged valid. It is possible that a combination of surrogates will obtain a better correlation, such as TOC along with color, turbidity, pH, etc. LDEQ is currently researching these options.

Response: EPA agrees that it would be ideal to have data collected from the modeled waterbody for relating TOC to CBOD and NH3-N to TKN. However, for these subsegments, there was insufficient data from which these relationships could be developed.

7. LDEQ takes exception to the equating of COD to CBODu in some of the TMDLs. There is no data to support this assumption. No direct correlation has been drawn between these two parameters. The only correlations that have been found are variable and dependant on the type of discharge. LDEQ requests that facilities with only COD limits be removed from the WLA load calculations.

Response: EPA agrees that COD is not an ideal indicator of CBODu. However, EPA believes that most effluents that exert significant COD are likely to exert some oxygen demand in natural waterbodies and therefore the discharges with COD limits should be included in the TMDLs.

8. CBODU and Org-N settling rates were not used. This is not justifiable in areas dominated by agricultural activities and is poor practice for TMDLs on Louisiana waters. The models must be revised to include settling rates.

Response: Without the use of settling rates, all of the pollutant loading remains in the water column where it can consume oxygen. Depending on the model settings for conversion of settled pollutant loading to SOD, the model can be more conservative without settling rates. Other applications of water quality models for TMDLs on southern Louisiana waterbodies have not used settling rates and have been approved by LDEQ.

9. The TMDLs should be for biochemical oxygen-demanding substances instead of DO. DO is an indicator of the impact of biochemical oxygen demanding load, hydrologic modifications, excessive algae blooms, etc.

Response: The TMDLs in Section 5 of each report are already expressed in terms of oxygen demand.

10. Nitrification inhibition option number 2 is valid for Louisiana's waterbodies. Various studies have shown that Louisiana does not have a buildup of NH3-N in its waterbodies. If option 1 was needed for a proper calibration then that should be stated as such.

Response: The nitrification inhibition option was set based on algorithms in other widely used water quality models. Option 1 has been used in other water quality modeling applications for TMDLs on southern Louisiana waterbodies that have been approved by LDEQ.

11. A winter projection model was not developed for most of the TMDLs. Winter projection models must be developed to address seasonality requirements of the Clean Water Act. Where point sources have seasonally variable effluent limitations or such seasonal variations are proposed, a winter projection model is required to show that standards are met year-round.

Response: As discussed in Section 4.2 of each report, summer is the most critical season for meeting the year round standard for DO for this subsegment. Therefore, the summer simulation satisfies the seasonality requirements of the Clean Water Act. Performing additional simulations to evaluate permit limits that are seasonal or hydrograph controlled releases was not required for developing these TMDLs and can be done by LDEQ or by permittees.

12. There was no documentation (LA-QUAL plots) to indicate that the model was calibrated to all hydrologic parameters (i.e. flow, width, depth, time of travel, velocity, chloride balance, etc.). Apparently flow balances were performed, however a flow balance is not a hydrologic calibration. Most of the models must be recalibrated with adequate hydrologic data. Calibration plots for all of the hydrologic parameters must be provided in the appendices.

Response: The values of depth, width, and flow in each model were estimated based upon the most appropriate available information. Hydraulic calibration of each model was not possible due to a lack of data.

13. The calibration and projection plots for dissolved oxygen must be provided in the body of the reports. Additional projection plots for CBODU, NH3-N, and Org-N must be provided in the appendices.

Response: The placement and number of plots in the draft reports are acceptable.

14. The calibration simulation must be used as the baseline for the sensitivity analysis, not the projection simulation. LDEQ requests that all TMDLs be revised in this regard.

Response: The sensitivity analysis can be developed using either the calibration or the projection as a baseline. EPA will consider this in future development of TMDLs in Louisiana.

15. A list of all point source dischargers must be provided in the body of the reports. Only dischargers with flows that reach the named waterbody should be included in the TMDLs.

In several TMDLs, a default 0.001 MGD flow rate was assigned to dischargers where a flow rate was not available. This practice is unacceptable to LDEQ. This default flow rate is extremely low (LDEQ would typically use 0.005 MGD as a minimum) and could strictly limit these dischargers' allowable permit loads when their permits are renewed. Additional research should be done to determine the facility type and anticipated flow rates of these facilities.

Response: The placement of the list of point source dischargers in the draft reports is acceptable. The dischargers with no flow rate information are believed to have very small flow rates representing a very small portion of the total TMDLs. The actual flow rate for each facility can be determined by LDEQ when the facility's permit is being renewed.

16. LDEQ does not agree with the minor point sources loads being subtracted from the NPS load as was done in several of the TMDLs. The pollutant loads being addressed are non-conservative loads. Many of these dischargers are located on small tributaries to the 303(d) waterbody which have recovered prior to entering into that system. Thus they are not contributing to the pollutant loads in the impaired waterbody. LDEQ's current procedure is to add these loads to the WLA portion of the TMDL.

Response: In the reports for which this comment is applicable, the TMDL calculations have been revised so that these loads are added to the WLA portion of the TMDL (same as LDEQ's procedure). For most of the draft reports, the TMDL calculations already used LDEQ's procedure of adding the minor point sources to the modeled loads.

17. Proper justification must be provided when using a nonpoint source margin of safety value other than the typical LDEQ value of 20%.

Response: The nonpoint margin of safety (MOS) was set to 10% based on other TMDLS on southern Louisiana waterbodies that have either been developed by LDEQ or approved by LDEQ. Eleven TMDL reports from LDEQ's website were reviewed to examine the explicit MOS for nonpoint sources. All 11 of these TMDLs were for oxygen demanding substances in the Mermentau or Vermilion-Teche basins. The explicit MOS for nonpoint sources was set to 20% for 2 reports, 10% for 3 reports, and 0% for 6 reports. Therefore, the value of 10% was considered to be a typical value that did not need special justification.

18. LDEQ has major concerns relating to the use of a one dimensional steady state model in coastal bays, lakes and estuaries. These systems are typically dominated by tides and winds and do not behave like riverine systems. LAQUAL can be used to simulate estuarine systems with riverine characteristics and some tidal influences; however to use it in these applications exceeds the model's recommended input limitations and appears to produce a meaningless output. Also the systems' unique hydrological characteristics do not adapt well to LAQUAL's one-dimensional capabilities. A multi-dimensional model such as WASP should be used for these waters. While a dynamic model would be preferred, a steady-state multi-dimensional model would be acceptable if it adequately addresses tidal influences. LDEQ objects to the use of LAQUAL in determining TMDLs for coastal bays, lakes and estuaries.

Response: A one dimensional steady state model such as LAQUAL was considered to be appropriate for all of these subsegments based on the amount of data that were available. Proper application of a multi-dimensional model or a dynamic model would require much more data and is simply not necessary for these waterbodies. For large, wide waterbodies, WASP will yield the same results as LAQUAL if the configuration of elements and model coefficients are the same between the two models.

19. The report uses the term synoptic survey multiple times. Please describe in detail what area this survey encompassed as well as site locations and what parameters were tested. Also, the raw data from this survey must be included in the appendices as support for the model inputs and calculations.

Response: A description of the synoptic survey and a summary of the data have been added to the appendices for each report in which those data are used.

20. In many of the calibration models the average water quality data from several LDEQ stations were used. It has been LDEQ's experience that a better calibration can be accomplished by using a single day's water quality and flow data. The additional daily values could then be used to perform multiple verifications of the model parameters before proceeding to the projection

stage. The flow data should be collected at the same time as the water quality data in order for the model to be valid.

Response: The models were calibrated to averages over multiple sampling events to minimize the effects of any single field measurement that might be of questionable quality or indicative of conditions that may have lasted only a very short time. For large systems with long residence times, using only a single snapshot of water quality data is often not representative of steady state conditions for that system.

21. Grammatical errors and misspelled words were found in these reports.

Response: The reports have been reviewed for grammar and spelling.

22. There does not appear to be any significant anthropogenic source of nutrients from agriculture, silviculture, aquaculture or urban runoff in many of these subsegments. Therefore, any occurrence of low DO is almost certainly natural. As a result, a UAA for the area is necessary to reset the DO standard. A TMDL is unwarranted for these subsegments,and LDEQ takes exception to EPA generating TMDLs which are impossible to implement.

Response: EPA is required to generate these TMDLs based on the Modified Court Ordered 303(d) List and the requirements of Section 303(d) of the Clean Water Act and regulations at 40 CFR 130.7.

23. LDEQ's nutrient standard is based on total phosphorus (TP) and total nitrogen (TN), not total inorganic nitrogen (TIN). Since phosphorus is not the limiting constituent in Louisiana, the nutrient allocations must be in terms of TN and only TN.

Response: LDEQ's nutrient standard (LAC 33:IX.1113.B.8) does not specify that nitrogen to phosphorus ratios should be based on total nitrogen. However, EPA will consider this in future development of TMDLs in Louisiana.

In the coastal areas, the nitrogen to phosphorus ratio used was based on freshwater streams and is not applicable to brackish Gulf waters. LDEQ takes exception to the calculation of a TMDL based on TN/TP ratios derived from waterbodies other than the modeled waterbody. It is LDEQ's experience that the natural allowable TN/TP ratio is waterbody-specific and can vary dramatically between streams.

Response: EPA agrees that it would be ideal to have a large database of nitrogen to phosphorus ratios for each waterbody. However, because these subsegments have only limited nutrient data, the previously developed nitrogen to phosphorus ratio that was used in the draft reports is considered acceptable.

LDEQ has not adopted the EPA recommended ammonia criteria (1999) and takes exception to its use in this TMDL. In general, LDEQ does not accept EPA's use of national guidance for TMDL endpoints. The nationally recommended criteria do not consider regional or site-specific conditions or species and may be inappropriately over protective or under protective. No ammonia nitrogen toxicity has been demonstrated or documented in any of the waterbodies in these TMDLs. The general criteria (in particular, LAC 33:IX.1113.B.5) require state waters be free from the effects of toxic substances.

Response: Ammonia TMDLs were developed for two subsegments based on the requirements of Section 303(d) of the Clean Water Act and regulations at 40 CFR 130.7 and the fact that the Modified Court Ordered 303(d) List included ammonia as a suspected cause of impairment for those two subsegments. National guidance for ammonia toxicity was used in the absence of any numerical state water quality standards for ammonia.

24. The implicit margin-of-safety must not be quantified.

Response: The text of the reports has been revised to eliminate any quantification of the implicit margin of safety.

25. EXECUTIVE SUMMARIES: Add summary tables of the WLAs, LAs, and TMDLs showing the allocations and margins of safety.

Response: The summary tables of the WLAs, LAs, and TMDLs can be easily found in Section 5 of each report and do not need to be repeated in the executive summary.

26. <u>Temperature Correction of Kinetics</u>: A temperature correction factor was set for reaeration. It is LDEQ's standard practice to allow LAQUAL to calculate this factor. There is more guidance on this in the LAQUAL User's Manual.

Response: The temperature correction factor was reaeration was set to the value of 1.024 based on guidance in Section 3.3.8 of the LTP.

27. <u>Water Quality Kinetics</u>: The Louisiana reaeration equation was used on reaches that are outside the maximum depth that it was designed for. A more appropriate reaeration equation must be selected.

Response: The Louisiana equation yielded reaeration coefficients that appeared more reasonable than coefficients from other equations.

28. Water Quality standards and designated uses tables did not include the BAC (bacterial criteria) values.

Response: The water quality standards for bacteria are not relevant for these TMDLs.

29. The statement was made in the Initial Conditions paragraphs in several of the reports that temperature was specified because the temperature was not being simulated. The section then states, "For constituents not being simulated, the initial concentrations were set to zero …". Initial conditions provide a starting point for the iterative solution of modeled constituents. They also provide values for constituents that are needed as input but are not being simulated.

Response: EPA appreciates this comment.

30. Several reports describe the benthic ammonia source rate as a calibration parameter; however a review of the data type 13 calibration input section indicates a value of zero for this parameter, in all reaches.

Response: The benthic ammonia source rate was used as a calibration parameter; the value of that parameter that provided the best fit between predicted and observed values was zero.

31. Calibration, and Projection, Data type 27: A salinity value was set to zero in the boundary conditions for both the calibration and the projection models in several of the TMDLs. With this value set to zero the model will automatically adjust the values of the lowest reach's elements to the value set in the boundary conditions. Since most of the models were one-reach, one-element models, the model automatically set the element salinity to zero, thus calculating an inaccurate value for the DO saturation.

Response: The only models where salinity was set to zero in the downstream boundary conditions were those models where salinity was not considered high enough to have a significant impact on DO saturation.

32. It is not LDEQ's standard procedure to use a zero headwater flow. You may not have input a headwater flow, but the model did. Without a headwater flow the model would have crashed and not run. The model's programming allows for a 0.0000001 cms flow rate when the modeler has not input a headwater flow.

Response: Only two simulations (calibrations for Spanish Lake and Big Constance Lake) used a zero headwater flow. For all practical purposes, 0.0000001 m3/sec is the same as zero flow.

33. Hydraulics and Dispersion: The use of constant widths and depths requires proper justification.

Response: The widths and depths were justified in Section 3 of each report.

34. Several reports state that algae were not simulated because algae did not appear to have significant impacts. What was the evidence for this statement? Did the contractor have any Chlorophyll a measurements?

Response: This statement was based on general knowledge of the Mermentau and Vermilion-Teche basins as well as a limited amount of diurnal DO data collected in these basins.

SPECIFIC COMMENTS FROM LDEQ FOR BAYOU DU PORTAGE:

1. Page 3-5, 3.8 HEADWATER AND TRIBUTARY FLOW RATES: The headwater flow was estimated using the ratio of flow to drainage area from USGS station 7381440, Bayou Gross Tete at Rosedale. The flow at this station is somewhat dependant on the overflow from False River, via the False River overflow canal. However, it may not be a significant factor on Bayou Gross Tete at Rosedale during periods of critical low flow (calibration period). This fact should be considered and discussed.

Response: Section 3.8 of the report has been revised to include this information.

2. Page 4-3, 4.4 POINT SOURCE INPUTS: The St. Martin Sugar Mill is physically located in the subsegment. The facility discharges into Bayou Martin, which drains into Bayou Teche. Therefore, the facility should not be included in this watershed TMDL.

Response: This facility was included in the Bayou du Portage TMDL because it was not included in the Bayou Teche TMDL that LDEQ developed.

3. Calibration, and Projection, Data type 27: A salinity value was set to zero in the boundary conditions for both the calibration and the projection models. With this value set to zero the model will automatically adjust the values of the lowest reach's elements to the value set in the boundary conditions. Since this reach only had one element the model automatically set it to zero, thus calculating an inaccurate value for the DO saturation.

Response: EPA believes this comment was intended for a report other than the one for Bayou du Portage. The Bayou du Portage model did not include salinity and had 5 elements.

GENERAL COMMENTS FROM LOUISIANA STATE UNIVERSITY (LSU) AG CENTER
(some of these comments may not apply to this report):

Through this letter the Louisiana State University AgCenter would like to submit official comments on TMDLs for dissolved oxygen and nutrients associated allocations for waterbodies in:

- Vermilion River Cutoff
- Bayou Chene
- Bayou Petite Anse
- Bayou Tigre
- Big Constance Lake and Mermentau Coastal Bays and Gulf Water
- Charenton Drainage and Navigation Canal and West Cote Blanche Bay
- Chatlin Lake Canal/Bayou Du Lac and Bayou Des Glaises Diversion Channel
- Dugas Canal
- Franklin Canal
- Freshwater Bayou Canal
- Irish Ditch/Big Bayou
- Lake Arthur, Grand Lake, and Gulf Intracoastal Waterway
- Lake Peigneur
- New Iberia Southern Drainage Canal
- Spanish Lake
- Tete Bayou
- Bayou Carron
- West Atchafalaya Basin Protection Levee Borrow Pit Canal

The number of different TMDLs sent out for comment at the same time may overwhelm the public's ability to comment. With only 30 days to prepare and submit comments it is impossible for a qualified faculty member to review the supporting data in depth and attend to his(her) official responsibilities. I realize that the agency is under time constraints on completing these, but I earnestly request that more time per proposed TMDL be given in the future.

We must make several other general comments and objections that apply to most of the proposed TMDLs. In many cases the data used to calibrate the models for the stream segments was collected in the fall of 2000 near the end of a three year drought. Historic low flows were often commented on in the text of the TMDL. Low flows result in a biased estimate of the natural ability of the stream to reaerate and cleanse itself of pollutants. Low flows also enable the benthic blanket to accumulate and remain in place undisturbed causing overstatement of the benthic oxygen demand and the SOD which were in many cases the primary oxygen demand loads in the stream. While it is true that the high flows that come from storm events carry more organic and sediment loads into the stream, the high flow rates also scour material from the bottoms and move it on to a final deposit at the stream terminus. It was thus that most of Louisiana and all of our coastal areas were built. Prolonged drought conditions do not allow this natural cleansing to occur. Thus it is our belief that the part of the oxygen demand load attributed to benthic and sediments is overstated and that new data must be collected during normal rainfall conditions and the models re-calibrated.

Response: The Louisiana water quality standards are applicable during all flow conditions greater than the 7Q10. Because 7Q10 flow is frequently the most critical condition for maintaining the DO standard, it is desirable to collect field data for model calibration during times when the hydrology is as close as possible to 7Q10 conditions. It is believed that the flow conditions for these waterbodies may have been near 7Q10 conditions, but probably not lower than 7Q10 flows. Therefore, the summer-fall 1998 data is desirable for model calibration.

In far too many of the proposed TMDLs the phrase *"an intensive field survey was not conducted for the study area due to schedule and budget limitations"* was found. If municipalities, agriculture, and business entities are to be asked to make large commitments of funds, time and effort to resolve our water quality problems they deserve to have the benefit of a serious study of the problem. We request that all of the proposed TMDLs that contain this statement have this problem corrected and that TMDLs be prepared based on complete studies.

Response: There is no requirement for collecting a certain amount of data to make a TMDL valid. If additional data are collected in the future by LDEQ, other agencies, or local stakeholders, then those data can be evaluated at the time and the implementation of the TMDL can be altered as necessary. As outlined in the 1991 EPA document titled "Guidance for Water Quality-Based Decisions: The TMDL Process", developing and implementing TMDLs is a process and not a one-time event.

In several of the proposed TMDLs data was used that is 9 or 10 years old from studies on point source discharges. While the data is probably high quality it assumes that no change in the plant or its load have occurred in the last decade. This assumption may not be defensible. In the TMDLs where a treatment plant was included in the model the margin of error was calculated by using 125% of the design capacity. This assumes a plant will perform at the same level when it is operated in excess of its design load. This assumption is also questionable.

Response: For several subsegments, old data sets were used for calibration because they provided more extensive data than newer data sets. However, all of the projection runs simulated point source discharges based on the most recent information available. Simulating point source discharges at 125% of design flow is simply a way of incorporating an explicit margin of safety and does not assume that the facility can actually treat that much wastewater.

The standard for dissolved oxygen (DO) was held at 5 mg/L in some steams on a year round basis, even if it received or discharged into a stream with 5 mg/L winter and 2 or 3 mg/l summer standards. Other streams had a year DO oxygen standard of 4 mg/L. We strongly suggest that a review be made of the DO standards for all of the streams in south Louisiana that are shallow, sluggish, and subject to tidal influence and that uniform standards be set. In view of the remarks that achieving a DO of 5 mg/L was impossible in some of the streams that had little loading from human activities, we believe that the summer standard of 2 mg/L is much more applicable to these streams.

Response: The TMDLs are required to be developed for the existing DO standard, which is 5 mg/L year round for many of these subsegments. If the DO standard is revised in the future for any of these subsegments, the TMDL and implementation can be altered as necessary as part of the TMDL process.

Many of these TMDLs were drafted by an out of state contractor and do not appear to be as well researched as those drafted by LDEQ. Very little data was included in the contractor drafted TMDLs summaries as compared to the ones prepared by or in conjunction with LDEQ. Additionally, the bulk of the text appeared to be standard wording in all documents with short relevant inserts. We would request that if outside contractors be used in future TMDL assessments that they be held to the same standard of information inclusion that LDEQ provides. Stream diagrams and maps are often needed when reviewing descriptive text on stream location, tributary insert, and exact location.

Response: These TMDLs contain all the required components of a TMDL and the level of detail is considered acceptable. Because these TMDLs could not be funded at the same level as most of LDEQ's DO TMDLs, the analysis and documentation was not as extensive as most of LDEQ's DO TMDLs. However, some of the information that was mentioned in the comment (stream diagrams and maps) was included in the reports, but they were placed in the appendices (which were available from EPA upon request).

GENERAL COMMENTS FROM LOUISIANA FORESTRY ASSOCIATION

Through this letter the Louisiana Forestry Association would like to submit official comments on TMDLs for dissolved oxygen and nutrients associated allocations for waterbodies in:

- Vermilion River Cutoff
- Bayou Chene
- Bayou Petite Anse
- Bayou Tigre
- Big Constance Lake and Mermentau Coastal Bays and Gulf Water
- Charenton Drainage and Navigation Canal and West Cote Blanche Bay
- Chatlin Lake Canal/Bayou Du Lac and Bayou Des Glaises Diversion Channel
- Dugas Canal
- Franklin Canal
- Freshwater Bayou Canal
- Irish Ditch/Big Bayou
- Lake Arthur, Grand Lake, and Gulf Intracoastal Waterway
- Lake Peigneur
- New Iberia Southern Drainage Canal
- Spanish Lake
- Tete Bayou
- Bayou Carron
- West Atchafalaya Basin Protection Levee Borrow Pit Canal

The number of different TMDLs sent out for comment at the same time may overwhelm the public's ability to comment. With only 30 days to prepare and submit comments it is impossible for qualified persons to review the supporting data in depth and attend to their other responsibilities. I realize that the agency is under time constraints on completing these, but I earnestly request that more time per proposed TMDL be given in the future.

Due to the shear volume of TMDLs released for comment, the lag time for gathering data and the work necessary to review the TMDLs, I will limit my comments to only three segments. Many of these comments will likely be appropriate for the others.

The three waterbodies are Bayou du Portage, Dugas Canal, and Tete Bayou which are listed as impaired due to dissolved oxygen (DO) or DO and nutrients. The extent to which the TMDL reports can be reviewed is greatly limited by Region VI's decision to exclude from the website materials contained in the appendices of these reports. We can appreciate that voluminous appendices may be impractical to provide in electronic form, however simple tables (e.g., model kinetic rate inputs and TMDL calculations) and essential figures (e.g., model setup vector diagram and model calibration results) providing fundamental information about the TMDL should be contained in the body of the report in order to be available to the reader.

We have provided below some of our concerns relating to this group of draft TMDL reports:

Insufficient flow and water quality data are available for a credible model calibration.

These TMDL reports epitomize misapplication of water quality models. If measured data needed as model inputs do not exist, then one should not apply the model. Each of the three TMDL reports we reviewed was found to be lacking in data essential to water quality modeling. Specific examples of insufficient data that we identified in the Bayou du Portage TMDL report include:

- Absence of spatial definition in water quality data: The calibration data are stated as representing average values measured by LDEQ during the timeframe of June through September 1998 at a single location (LA station 0676) of a 10- mile subsegment. Unless 0676 is, by coincidence, near to the point of minimum DO in the waterbody, there are no measured DO values in the vicinity of the critical reach of the waterbody. In other words, the maximum loadings is based largely upon unmeasured conditions.

Response: EPA appreciates this comment. This issue will be taken into consideration in future TMDLs for Louisiana streams.

- Absence of flow measurements: Apparently no flow measurements were made during the LDEQ monitoring program. Instead flows were estimated based on drainage area. Presumably, the reference to hydrologic data made in section 3.2 refers to depth and width measurements.

Response: The statement that LDEQ collected hydrologic data during the 1998 assessment survey is incorrect and has been removed from Section 3.2.

- Absence of measured ultimate carbonaceous BOD: Measurement of CBODu, a critical model calibration parameter, was not performed in the LDEQ ambient monitoring program (which is conducted for purposes other than water quality modeling efforts). The report is unclear as to how CBODu values at 0676 were estimated 1 but it appears TOC data measured during times other than the calibration period were related to CBODu. Section 3.9 of the report states headwater CBODu loadings were estimated by applying a two-step relationship; first TOC is related to CBOOD5 which, in turn, is related to CBODu. Thus, apparently CBODu concentrations were based on TOC measurements made outside of the critical period and in the absence of a direct relationship between TOC and CBODu. How can a model be calibrated with such uncertainty in one of the two primary calibration parameters?

Response: See response to comment 6 in LDEQ General Comments.

- Use of default kinetic rates taken from guidance manual: The absence of CBODu measurements also implies the absence of measured CBOD decay and nitrification rates. Consequently, the TMDL analysis must rely on default values provided by LDEQ as guidance.

Response: EPA appreciates this comment.

- Absence of headwater loading data: Headwater loadings were not measured but, instead, are based on a limited number of samples collected at stations outside of the waterbody. Not only are the locations outside the waterbody, they are for other parameters: Ammonia nitrogen is estimated from TKN and CBODu from TOC, as noted above.

Response: EPA appreciates this comment.

In summary, it appears (in the absence of detailed information apparently contained in the TMDL report appendices) that the only model inputs measured directly are DO, temperature, and stream width and depth (for some reaches). This data set is grossly inadequate for a credible modeling analysis.

Response: EPA appreciates these comments. They will be taken into consideration in future TMDLs for Louisiana streams.

Measurement of sediment oxygen demand and releases of CBOD and nitrogen should be made.

The reports we reviewed state that calibration was performed by adjusting the loading parameters associated with the bottom sediment contained in the waterbody. Hence, this is the primary model input used for model calibration.

In the absence of measured values of sediment conditions, however, there is no means by which the validity of the selected values for SOD, benthic ammonia source rate, and mass loads of organic nitrogen and CBODu can be confirmed. Although the selected values may accomplish the objective of matching predicted DO with measured DO, given the uncertainty in so many of the other model inputs, one cannot know if the sediment parameters are, in fact, correct. If, for example, the default CBOD decay rate is in error, the actual improvement in DO due to a reduction in loadings from the sediment may be entirely different than that predicted by the model. Furthermore, since DO appears to have been measured only at one station it is not clear how any differences in sediment conditions among different reaches could have been accounted for.

Direct and indirect measurement methods for SOD and related sediment loading rates are well established. In situations where sediment relations play a significant role in determining conditions in the overlying water, measurements of these reations should be made to fix the model inputs. Then, other parameters for which the known value is less certain can be refined through model calibration.

Response: Analyses of SOD indicate that it is a highly variable parameter, and these analyses are time consuming and expensive. It is uncertain that having actual measurements of SOD in the system would make the model a more realistic representation of that system. The SOD values used in the model(s) were within the range of values reported in literature.

There is no rational basis for establishing model calibration.

Determination that the calibration is "acceptable" is subjective. The Agency needs to develop criteria for establishing if a model is calibrated or not. Determination for model calibration status should extend beyond simply comparing predicted vs. observed DO/BODu. Consistency of model input values from reach to reach and with values either measured or modeled in other studies must be considered. A calibrated model accurately represents the mechanisms causing the water quality chemistry (e.g., DO, BOD, etc.) rater than acting as a "black box" capable of matching the response. This is particularly important where only one data set is employed.

Response: EPA appreciates this comment. This issue will be taken into consideration in future TMDLs in Louisiana streams.

Expression of percent load reduction on a total load (natural and manmade) basis understates the actual load reduction stakeholders may be facing.

The ultimate purpose of TMDL determination is to establish the loading reduction necessary to achieve water quality criteria. Since natural (background) loads typically cannot be reduced, stakeholders contributing to the manmade loads will be called upon to reduce loads. The Bayou du Portage TMDL calls for a total load reduction of 30 percent. If the natural loads contribute 50 percent of the total load, the reduction for stakeholders will be 60 percent.

The Bayou du Portage TMDL report states "it would be difficult to estimate natural NPS loads for Bayou du Portage." We agree with this, given the limited data available for this waterbody. However, the conclusion should be that additional data must be generated to ultimately allow for a reasonable estimation of natural NPS.

Failure to attempt to separate natural and manmade NPS loads also evades the issue of whether the DO standard can be met in the absence of any manmade loads. As LDEQ has successfully demonstrated for many waterbodies within the state, a DO standard of 5.0 mg/L is simply not attainable.

Response: See response to comment 5 under LDEQ General Comments.

Results of the Sensitivity Analysis should include percent change in the maximum daily loading.

We applaud the inclusion of the sensitivity analysis that provides an indication of the impact that uncertainty in various model input parameters has on the predicted minimum DO. While this is good information, the more important factor is the extent to which this uncertainty affects the predicted maximum daily load. This may be important in a situation where individual reaches exhibit different characteristics. For example, Table 6.1 of the Bayou du Portage TMDL report shows a 30% decrease in the BOD decay rate causes a change in the predicted minimum DO of 3 percent. This suggests the loading to the reach in which the minimum DO occurs could only be increased over the calculated TMDL by a relatively small margin (although not necessarily only 3 percent) to ensure that the minimum DO of 5 mg/L is achieved. However, it does not tell us anything about the impact this change in BOD decay rate has on the allowable loading to the reaches in which the minimum DO does not occur. Adding a column to the sensitivity analysis results table showing the percent change in the maximum daily load would greatly enhance the usefulness of the sensitivity analysis.

An additional point regarding the sensitivity analysis concerns the range examined for the input parameter SOD. Based on other TMDLs developed using the LA-QUAL model, we have observed that the reach-to-reach variation in SOD input values selected by the modeler can greatly exceed 30 percent. Consequently, a +/- 30 percent change may represent only a relatively small variation in this input parameter change range used in the sensitivity analysis should be at least as great as the reach-to-reach variable in the parameter.

Response: EPA appreciates these comments. These issues will be taken into consideration in future TMDLs for Louisiana streams.

The Louisiana Forestry Association (the LFA) strongly supports appropriate efforts to improve water quality and encourage good environmental stewardship in Louisiana's forests. These goals must be based on good science and consideration must be given to economic achievability.

The LFA has developed effective partnerships with agencies, landowners, universities, and industry to produce an effective Best Management Practices (BMP) manual for the forests of Louisiana.

We have been involved in teaching more than 10,000 individuals how to apply BMPs. The Forestry BMP compliance rate for Louisiana has advanced more than nine-fold in the last ten years. More than one thousand Louisiana Master Loggers continuing to teach the importance of BMPs and increased the use of these voluntary BMPs.

I would like to thank you for your consideration in reviewing these comments. The members of the Louisiana Forestry Association remain committed to improving the condition of Louisiana's surface waters. Our membership represents small and large forest landowners, both dependent on clean water for their health, prosperity, and recreation. As our population grows the demands for both clean water and the forest products we all use also increase. We again offer our support and assistance in achieving this goal.

Again, thank you for allowing us to submit formal comments, and please feel free to call upon us if we can be of any additional assistance.